Residents' Self-Perceived Errors in Transitions of Care in the Emergency Department

Dustin Smith, MD
J. Wayne Burris, MD, MPH
Guisou Mahmoud, MD
Gregory Guldner, MD, MS

Abstract

Background The Accreditation Council for Graduate Medical Education requirements for systems-based practice state residents are expected to participate in identifying system errors and implementing potential systems solutions. The objective of this study was to determine the numbers of perceived errors occurring from patient pass offs between resident physicians in our emergency department.

Methods Using a prospective observational study, we queried emergency medicine residents about perceived errors in the transition of care using trained research assistants and a standardized protocol. Transition of care was defined as the transfer of responsibility to evaluate and treat and disposition of a patient in the emergency department from 1 resident physician to a second oncoming emergency department resident physician. Mean resident-perceived errors per shift and per patient transfer of care were calculated. Additionally, the mean number of perceived errors impacting patients was calculated.

Results Emergency medicine residents on 107 shifts reported receiving 713 patients in pass off with a mean of 7 patients per physician per shift, with 40% of patients passed off needing some intervention (mean of 2.8 patients per provider per shift). Nineteen of the 107 shifts (17.8%) during which a resident took patients from a prior provider had a perceived error in at least 1 patient signed off. Of the 713 patients transitioned, the receiving physician perceived an error related to the transition of care for 23. Two of the 23 errors were determined by reviewing emergency medicine attendings to not be errors, and for 9 the receiving physician perceived an impact on the patient. All were delays in care or disposition.

Conclusion Our data suggest emergency medicine residents were able to perceive errors related to transitions of care, describe the types of pass-off errors, and, to a lesser degree, describe the impact these errors have on patients.

Background

Training programs in emergency medicine (EM) are charged by the Accreditation Council for Graduate Medical Education (ACGME) with the responsibility of providing experience that will facilitate competency in the practice of EM prior to graduation from residency training. The systems-based practice competency requirements state residents are expected to participate in identifying system errors and implementing potential systems solutions.[1] The transition of patient care, or "hand off," between 2 physicians is an area of the medical system known to have risk for error.[2] It has not yet been definitively determined what educational steps are necessary for residents to become competent at minimizing errors during transitions of care. One necessary step of resident education is for the resident to first perceive and label when an error occurs. The objective of this study was to determine the numbers of perceived errors occurring from patient hand offs between resident physicians in our emergency department (ED).

Methods

We used a prospective observational study of EM residents to query physicians about perceived errors related to transition of care. Medical students functioning as research assistants (RAs) were trained to query EM residents working in our academic, quaternary care ED between July 24 and September 1, 2006. We define "transition of care" as the transfer of responsibility to evaluate and treat and disposition of a patient in the ED from 1 resident physician to a second ED resident physician. No protected health information was recorded nor was the identity of the queried physician or the physician who initially cared for the patients. The Institutional Review Board approved this research and the physicians involved each consented to participate.

Our questionnaire was developed by consensus by a committee of board-certified attending EM physicians

All authors are at Loma Linda University Medical Center and Childrens Hospital. **Dustin Smith, MD, J. Wayne Burris, MD, MPH, and Guisou Mahmoud, MD,** are Assistant Professor of Emergency Medicine. **Gregory Guldner, MD, MS** is Associate Professor of Emergency Medicine.

Corresponding author: Dustin Smith, MD, Loma Linda University Medical Center and Childrens Hospital, 11234 Anderson Street, A 108, Loma Linda, CA 92354, 909.558.4085, ddsmith@llu.edu

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authoring the study. RAs were trained by the principal investigators in a small group session prior to being tasked with collecting data. We developed a standardized protocol that required RAs to approach EM residents in the ED who were working a shift that involved taking over the care of patients from a prior provider. For several initial queries, the RAs were accompanied by 1 of the investigators to standardize the query process and address any issues that arose during the process. The research group met to discuss these issues and standardize the process prior to collection of study data.

Our setting is a level I trauma center that saw approximately 56 000 patients a year in the ED during the study period, including 22 000 children in our pediatric ED, and had an overall admission rate of approximately 23%. There were 6 EM postgraduate year-2 (PGY-2) or EM PGY-3 resident shifts per day and 4 EM PGY-1 or off-service resident shifts per day. Resident shifts were 10 hours in length. The EM residency program is a PGY-1—3 program with 38 residents at the time of the study. Off-service residents from internal medicine, obstetrics and gynecology, psychiatry, and pediatrics and pediatric EM fellows rotate in the ED. The study focused solely on EM residents in the ACGME-accredited residency. Only second- and third-year EM residents accepted patients passed off from other providers, and the ED had no standardized pass-off procedures or pass-off form used during this study. Each pair of physicians involved in a pass off determined their own method of transitioning care.

The RAs queried providers 5 hours after the start of their shift to allow for an opportunity for the new physician to detect errors related to the patient care transition. Queries were performed on both day and night shifts in addition to weekends, although not necessarily on consecutive shifts. A written protocol was followed using standardized wording for each encounter. Observers asked the providers to identify the number of patients they took over from the prior provider. These patients were further divided into those that already had a disposition (admitted or discharged) and were expected to require no further care or intervention on the part of the physician, and those that required the oncoming physician to undertake some task related to patient care such as checking labs or imaging studies, reassessing a patient's clinical condition, and arranging for the patient's disposition.

RAs then asked, "Did you have any issues or difficulties with patients you took in pass off that you believe were at least partially due to the hand off?" and recorded the responses, including (1) a brief description of the event, (2) factors the resident believed may have caused or contributed to the event, (3) whether the patient was passed off as already having a disposition and requiring no expected action on the part of the new physician or a patient requiring some follow-up action, and (4) if they believe there was any harm to the patient as a result of the error.

TABLE 1 **Distribution of Patients Signed Off as a Function of Type of Physician Receiving and Transferring Care**

Transferring Physician Level	Receiving Physician Level		Totals
	EM2	EM3	
EM1	10	17	**27**
EM2	18	71	**89**
EM3	86	450	**536**
Pediatric EM fellow	2	16	**18**
Off-service resident	16	12	**28**
Totals	**132**	**566**	**698**[a]

Abbreviation: EM, emergency medicine.

[a] 15 patients were missing data and could not be placed on this table.

After the conclusion of all data collection, 2 board-certified EM physicians (D.S. and G.G.) reviewed the resident's description of the perceived errors to confirm their qualification as errors. We did not further classify resident-perceived errors as errors of commission or errors of omission and our study did not confirm whether the errors impacted the patient.

Data analysis entailed calculating the mean resident-perceived errors per shift and per patient transfer of care and the mean number of errors residents perceived as impacting the patient.

Results

EM residents on 107 shifts (24 PGY-2 and 83 PGY-3) reported receiving 713 patients in hand off with a mean of 7 patients per physician per shift (range, 1–20; median, 6). Seventy-five shifts were from the adult ED and 32 were from the pediatric ED. Forty percent of patients with a transition of care were passed off as needing some intervention (mean of 2.8 patients per provider per shift). TABLE 1 shows the distribution of patient pass offs by type of physician receiving and transferring care.

Nineteen of the 107 shifts during which a resident took patients from a prior provider had a perceived error in at least 1 patient signed off, a rate of 17.8% of shifts with a least 1 error. Sixteen physicians noting an error reported only 1 patient with an error from sign-out. Two physicians noted 2 separate patients with errors from the same sign-out. One physician noted 3 separate patients with errors from the same sign-out. Overall, of the 713 patients transitioned during these 107 shifts, 23 were perceived by the receiving physician as having been associated with an error related to the transition of care—an error rate of

TABLE 2 **Residents' Perceived Errors and Impact on Patient Care**[a]

Transition	Resident's Perceived Error for Each Patient	Attending Confirmed Description Is Transition of Care Error	Perceived Impact to Patient
A	Pt had a broken arm and EM3 was told that pt should be admitted to the trauma service but pt's arm needed reduction in the ED. EM3 also did not know that there was an x-ray pending.	Yes	Delay in disposition
B	Pt's allergy to IV contrast was not passed on to new physician, and image with contrast had been ordered (incorrectly) by previous physician.	Yes	None
C	Pt was to be transported voluntarily to inpatient psychiatric facility but this plan was not passed on. A consultant was supposed to be called but the need to do so was not passed on. Tests needed to be performed but need to do so was not passed on.	Yes	None
D	Was told to check an x-ray but the x-ray was not ordered.	Yes	None
E	Plan for management unclear, requiring substantial reevaluation of the patient.	Yes	None
E	Plan for management unclear, requiring substantial reevaluation of the patient.	Yes	None
E	Plan for management unclear, requiring substantial reevaluation of the patient.	Yes	None
F	Pelvic exam was done but physical exam results were not passed off and were needed by oncoming physician.	Yes	None
G	Pt was a poor historian. Previous physician had obtained good history from family at bedside, but did not communicate thorough history to new physician. Thus, new physician did not have complete history because family was no longer at bedside when he or she came on shift.	Yes	None
H	Was told that a consultant was called but consultant was not.	Yes	Delay in disposition
I	Pt was scheduled to go home but instead had to be admitted to the clinical decision unit after reevaluation.	No error—progression of illness	None
J	More info became available that confirmed that patient no longer needed to be admitted.	No error—progression of illness	None
K	Second physician thought pt was sicker than what had been communicated in pass off. Dr had to reassess pt, add new lab tests and radiographs, and suture a laceration. Pt admitted instead of discharged as planned.	Yes	Delay in care
L	Was told that internal medicine admitted pt but consultant was never called.	Yes	Delay in disposition
L	Management plan unclear, requiring substantial reevaluation.	Yes	None
M	Paperwork required for patient transportation not completed, but physician was told that there was nothing to do for pt.	Yes	None
N	Radiologist not called to arrange for imaging study.	Yes	Delay in care
O	Labs for this pt were said to be normal but when checked by oncoming physician they were not.	Yes	None
O	It was not known that pt needed an LP as requested by the hospital to which the pt was to be transferred.	Yes	Delay in transport
P	Pt had been told by previous physician to follow up with family practice the next day. However, pt's insurance was not going to cover this office visit. Previous physician was not aware of this and thus neither was the new physician. New follow-up needed to be arranged and more detailed evaluation by the new physician now needed.	Yes	Delay in care
Q	Previous physician had not communicated that one reason pt came in was pain. New physician had to reexamine pt and CT scan was ordered.	Yes	None
R	CT wasn't ordered by previous physician, but new physician was told to check results as though it had been ordered.	Yes	Delay in care
S	Patient was passed off as needing to be admitted and admitting service was supposedly called but they did not know about the patient when recontacted.	Yes	Delay in disposition

Abbreviations: CT, computed tomography; ED, emergency department; EM, emergency medicine; info, information; IV, intravenous; LP, lumbar puncture; pt, patient.

[a] Transitions are listed A through S and may have more than 1 patient with a perceived error during the pass off.

3.2%. Nine of the 23 perceived errors in transition caused a perceived impact to the patient as determined by the receiving physician—a rate of 39%. All of these entailed delays in care or patient disposition, and the remainder was perceived as not having impact on patients. TABLE 2 shows the perceived errors and perceived impact on the patient. Two of the 23 resident perceived errors were classified by the reviewing attending physicians as not being errors. Transition I and J on TABLE 2 were determined to be progression of illness rather than transition error. This results in a corrected error of care transition rate of 2.9%. Nine of the 21 remaining errors in transition caused a perceived impact to the patient as determined by the receiving physician—a rate of 43%.

Discussion

Our study demonstrated PGY-2 and PGY-3 EM resident physicians found a perceived error during 17.8% of shifts and 2.9% of patients. Forty-three percent of the perceived errors were determined by the receiving physicians to have impacted the patient as a delay in care or disposition.

Research suggests attending physicians recognize the potential for errors during hand offs.[22] Several national bodies acknowledge the potential for errors during transitions of care. In 2006 The Joint Commission developed the explicit goal to improve hand-off communications,[3] and in December 2008 the Institute of Medicine's Report ''Resident Duty Hours Enhancing Sleep, Supervision, and Safety'' acknowledged that transition of care between physicians is a step that may result in error.[4]

Our study has several limitations. It examined perceived error and did not attempt to determine if perceived errors constituted actual error as defined by a priori objective criteria. Although the perceived errors were validated as appropriate descriptions of error by 2 board-certified EM attendings, further classification of the errors as errors of commission or omission was not performed. Another possible limitation is recall bias as there was no independent individual witnessing the real-time information exchange during the hand off. Additionally, errors identified in our study represent only those errors perceived by the oncoming EM resident 5 hours into the shift. Some errors might not become apparent until later in the course of care. Finally, our study was not powered to determine if perceived errors are associated with provider experience level. The variability in physician experience and familiarity with the ED and hospital system may not be able to be generalized to other EM residency training programs.

Conclusion

Transition of care from the ED to inpatient care has been already studied and found to have risk for error. Horwitz et al[5] found that 29% of provider survey respondents had a patient of theirs experience an adverse event or near miss after an ED to inpatient transfer of care. Non-EM residents in training have been studied and, although recognizing other factors that may lead to errors, often perceive the ED as responsible for error.[6] However, these perceived transition of care errors are not solely found in EM residents in training. An analysis of closed malpractice claims by Singh et al[7] in *Archives of Internal Medicine* found errors in judgment (72%), teamwork breakdowns (70%), and lack of technical competence (58%) were the most prevalent factors contributing to medical errors involving trainees. Lack of supervision and problems with patient hand offs were the most prevalent types of teamwork problems given. In an analysis of closed ED malpractice claims, Kachalia et al[8] found that inadequate hand offs were a contributing factor 24% of the time.

Our study is the first to establish that PGY-2 and PGY-3 EM residents can identify a noteworthy percentage of what they perceive as errors in the transition of care. In 43% of these cases, residents reporting they perceived that the errors identified had an impact on patient care. The findings further show that EM residents can identify errors in the transition of care and describe the types of hand-off errors and the impact these errors have on the patients, meeting 1 of the ACGME systems-based practice requirements.

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